CLAIMS:

1. A radiation-emitting semiconductor device (10) comprising a semiconductor body (1) and a substrate (2), which semiconductor body (1) comprises a vertical bipolar transistor with an emitter region (3), a base region (4) and a collector region (5), which regions are each provided with a connection region (6, 7, 8), and the boundary between the base region (4) and the collector region (5) forms a pn junction, and, during operation, at a reverse voltage across the pn junction, or at a sufficiently high collector current, avalanche multiplication of charge carriers occurs, causing radiation to be generated in the collector region (5), characterized in that the collector region (5) has a thickness such that transmission of the generated radiation occurs, and the collector region (5) borders on a free surface of the semiconductor body (1).

2. A radiation-emitting semiconductor device (10) as claimed in claim 1, wherein the collector region (5) comprises a first sub-region (5A) that borders on the base region (4) and a second sub-region (5B) that borders on the first sub-region (5A) and that has a higher conductance than the first sub-region (5A), characterized in that the second sub-region (5B) of the collector region (5) has a smaller thickness than the first sub-region (5A) and borders on the free surface of the semiconductor body (1).

3. A radiation-emitting semiconductor device (10) as claimed in claim 1 or 2, characterized in that the surface of the semiconductor body (1) on which the collector region (5) borders is covered with a layer (40) comprising an electroluminescent material.

4. A radiation-emitting semiconductor device (10) as claimed in claim 1 or 2, characterized in that the surface of the semiconductor body (1) on which the collector region (5) borders is covered with an electrically insulating layer (9) which is transparent to the radiation generated and on which a gate electrode (11) is present having a part (11A) which is transparent to the radiation generated.

5. A radiation-emitting semiconductor device (10) as claimed in claim 4, characterized in that during operation of the device (10), the second sub-region (5B) of the collector region (5) is formed by a conductive channel near the free surface of the semiconductor body (1), which conductive channel is induced in the first sub-region (5A) by means of the gate electrode (11).

6. A radiation-emitting semiconductor device (10) as claimed in claim 5, characterized in that the gate electrode (11) comprises a metal layer which is provided with an aperture (11A).

7. A radiation-emitting semiconductor device (10) as claimed in claim 1, 2, 4, 5 or 6, characterized in that a part (4A) of the base region (4) bordering on the first sub-region (5A) of the collector region (5) comprises a semiconductor material having a smaller band gap than the rest of the base region (4B, 4C) and the collector region (5).

8. A radiation-emitting semiconductor device (10) as claimed in any one of the preceding claims, characterized in that the semiconductor body (1) is attached to the substrate (2) by a further surface opposite the free surface on which the collector region (5) borders, using an adhesive layer (12).

9. A radiation-emitting semiconductor device (10) as claimed in any one of the preceding claims, characterized in that the connection regions (6, 7, 8) of the emitter region (3), the base region (4) and the collector region (5) are situated at the surface of the semiconductor body (1) on which the collector region (5) borders.

10. A radiation-emitting semiconductor device (10) as claimed in any one of the preceding claims, characterized in that a radiation conductor (14) provided with means (15) for coupling the radiation generated in the device (10) into the radiation conductor (14) is present on the surface on which the collector region (5) borders.

11. A radiation-emitting semiconductor device (10) as claimed in any one of the preceding claims, characterized in that the device (10) forms an integrated circuit with two electrically insulated regions which are in optical communication with each other by means of the radiation generated.

12. A radiation-emitting semiconductor device (10) as claimed in any one of the preceding claims, characterized in that the material of the semiconductor body (1) comprises silicon, and, if applicable, a part (4A) of the base region (4) that comprises a semiconductor material with a smaller band gap comprises a composition of silicon and germanium.

13. A radiation-emitting semiconductor device (10) as claimed in any one of the preceding claims, characterized in that the substrate (2) comprises an insulator.

14. A method of manufacturing a radiation-emitting semiconductor device (10) in which, in a semiconductor body (1), a vertical bipolar transistor is formed with a collector region (5), a base region (4) and an emitter region (3), which are each provided with a connection region (6, 7, 8), characterized in that the semiconductor body (1) is formed as a thin layer (111) of a semiconductive material that is separated from a temporary substrate (22) by means of an electrically insulating layer (9), and the vertical bipolar transistor is formed in the semiconductor body (1), after which the substrate (2) is attached onto a side of the semiconductor body (1) opposite the electrically insulating layer (9), whereafter the temporary substrate (22) is removed.

15. A method as claimed in claim 14, characterized in that the substrate (2) is attached onto the side of the semiconductor body opposite the electrically insulating layer (9) by means of an adhesive layer (12).

16. A method as claimed in claim 14, characterized in that the electrically insulating layer (9) is removed, as a result of which the collector region (5) borders on a free semiconductor surface.

17. A method as claimed in claim 14, characterized in that the insulating layer (9) is coated with an electroconductive layer which is transparent to radiation.

18. A method as claimed in claim 17, characterized in that the electroconductive layer serves as a gate, and an inversion channel is formed in the collector region (5).

19. A method as claimed in claim 14, characterized in that in a semiconductor substrate (222) the electrically insulating layer (9) is formed by means of ion implantation, the semiconductor body (1) being formed by a part (111) of the semiconductor substrate (222) situated above the insulating layer (9), and the temporary substrate (22) being formed by the part (22) of the semiconductor substrate (222) situated under the insulating layer (9).

20. A method as claimed in claim 14, characterized in that the thin layer (111) of a semiconductive material is formed by the silicon layer of a silicon-on-insulator wafer.

21. A method as claimed in any one of the preceding claims, characterized in that the surface of the semiconductor body (1) on which the collector region (5) borders is provided with a radiation conductor (14) which is equipped with means (15) for coupling the radiation to be generated in the device (10) during operation into the radiation conductor (14).